



## PROBLEM SOLVING ACTIVITY: CLIMATE CHANGE AND DISEASE

Throughout human history, population has been increasing. However, the increase has not always been steady and uninterrupted. For example, during the mid-1400s, there was a sharp decline in population from the Black Death, or *bubonic plague*, which struck most of Europe and Asia. This plague killed more people than any other single disease; it claimed the lives of 25 per cent of the adult population of Central Europe and Asia. The population of England was reduced by about 50% between 1348 and 1379. In addition to bubonic plague, worldwide outbreaks of cholera, typhus, yellow fever and smallpox have claimed millions more lives. The more densely populated areas became, the more quickly diseases spread.

Scientists have reported that over 80% of the illnesses in developing nations are caused by waterborne germs. For example, more than 5 million people die each year from malaria transmitted by mosquitoes that breed in standing water. Another 20 million suffer from Guinea worm infections and another 200 million people are affected by *Schistosomiasis*.

Scientists also know that the transmission of disease is affected by climatic factors: temperature, humidity, surface water, wind, soil moisture and changes in forest distribution. Diseases like malaria are especially influenced by changes in these factors, since they require an organism like a mosquito to transmit the actual disease. It is predicted that climate change will change weather patterns which would in turn affect range (latitude and altitude), intensity and seasonality of many infectious diseases. In general, increased warmth and moisture would greatly increase the transmission of diseases.

There is no longer a question concerning the truth of the scientific predictions regarding climate change; we are experiencing it now. Clearly, global warming will cause changes in the origin and spread of infectious diseases. The ability of mankind to react or adapt is dependent upon the extent and speed of the change. The outcome will also depend on our ability to recognize epidemics early, to contain them effectively, to provide appropriate treatment, and to commit resources to prevention and research.





## ACTIVITY 1: UNDER THE WEATHER

DATA TABLE: RATE/LOCATIONS OF INFECTIOUS DISEASES (1994-2050)

DISEASE	VECTOR	POPULATION AT RISK 1994 (MILLIONS)	NEW CASES YEARLY	REGIONS AFFECTED	Probability (%) of increase	New cases each year	Population at risk by 2050
<b>Malaria</b>	Mosquito	2400	300-500 m	Tropics Subtropics	40%		
<b>Schistosomiasis</b>	Fluke	600	200 m	Tropics Subtropics	25%		
<b>Filariasis</b>	Mosquito	1094	117 m	Tropics Subtropics	12.5%		
<b>Sleeping sickness</b>	Tsetse fly	55	300000	Tropical Africa	12.5%		
<b>Guinea worm</b>	Crustacean	100	100000	S. Asia, Arabian Pen. C/W Africa	No Data available		
<b>Leishmaniasis</b>	Sand fly	350	500000	Asia S. Europe Africa Americas	12.5%		
<b>River blindness</b>	Black fly	123	17.5 m	Africa Latin America	25%		
<b>Chagas disease</b>	Triatomine bug	100	18 m	Central/ South America	12.5%		
<b>Dengue fever</b>	Mosquito	1800	10-30 m	All tropical regions	25%		
<b>Yellow fever</b>	Mosquito	450	200000	S. America Africa	25%		



## ACTIVITY 2: THE PESTS HAVE IT!

DATA TABLE: INFLUENCE OF CLIMATE CHANGE ON DISEASE VECTORS

Climate Change	Direct Impact on Vector	Impact on Vector Habitat	Impact on Parasite	Potential Impact on Disease Transmission
More heat waves				
Change in flooding				
Change in drought frequency				
Heavier snowfalls				
Sea level rise				
Extreme weather				

## Student Sheet 4

### ANALYSIS:

1. Why is the death rate from infectious and parasitic disease so much higher in developing countries than in developed countries?
2. Explain the relationship between infectious disease and climatic factors.
3. What specific aspect of climate change would affect the intensity, range and seasonality of diseases transmitted by carriers (mosquitos, fleas, etc.?)
4. What one factor would you think would be the most important factor for all types of diseases? Why?
5. How are the following diseases transmitted?
  - a. Dengue fever
  - b. Schistosomiasis
  - c. River blindness
  - d. Filariasis
  - e. Yellow fever
  - f. Sleeping sickness
  - g. Malaria
  - h. Guinea worm
6. Which diseases are expected to experience an alteration of 25%?
7. Which disease is expected to increase the most?
8. Which disease are scientists unsure about?
9. Considering an increase in temperature and precipitation to be the most evident direct effect of climate change, what will probably happen to the geographic distribution of diseases spread by mosquitos? Why?
10. Which regions of the world will be affected the most?
11. What could the effect be on temperate regions like the southern US and parts of Europe?
12. Considering what health specialists feel is the reason for poor health in many parts of the world, what could climate change mean for the 1/3 of the world's population that is already sick?
13. What do facts suggest about the future health of people in Africa, Southern Asia and some parts of Latin America?

# Effects of Climate Change on Human Health

